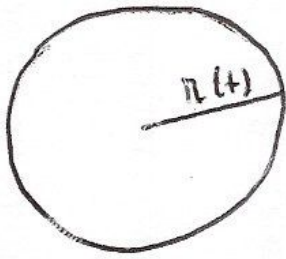


LISTA 0.2

1)



$$r(t_0) = 6\text{m}$$

$$r'(t_0) = 4\text{m/s}$$

$$A(t) = \pi r^2(t)$$

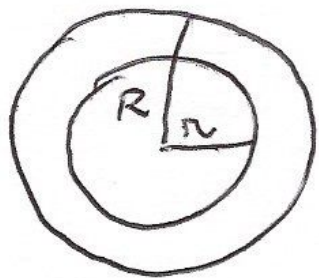
$$A'(t) = \pi \cdot 2r(t) \cdot r'(t)$$

$$A'(t_0) = 2\pi r(t_0) \cdot r'(t_0)$$

$$A'(t_0) = 2\pi \cdot 6 \cdot 4 = 48\pi\text{m}^2/\text{s}$$

LISTA 02

3)



$A(t)$ = área do círculo maior

$B(t)$ = área do círculo menor

$$A(t) - B(t) = 9\pi \text{ m}^2, \forall t$$

$$A'(t) = 10\pi \text{ m}^2/\text{s}, \forall t$$

Se $B(t_0) = 16\pi$, então $r'(t_0) = ?$

$$A'(t) = B'(t), \text{ pois } A'(t) - B'(t) = 0, \forall t$$

$$\Rightarrow B'(t_0) = 10\pi$$

$$B(t) = \pi r^2(t)$$

$$B'(t) = \pi \cdot 2r(t) \cdot r'(t)$$

$$B'(t_0) = \pi \cdot 2r(t_0) \cdot r'(t_0)$$

$$10\pi = \pi \cdot 2 \cdot 4 \cdot r'(t_0)$$

$$\Rightarrow r'(t_0) = 5/4 \text{ m/s}$$

$$B(t_0) = \pi \cdot r^2(t_0)$$

$$16\pi = \pi r^2(t_0)$$

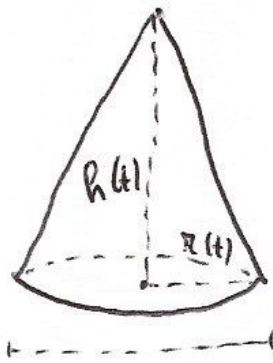
$$r^2(t_0) = 16$$

$$r(t_0) = \pm \sqrt{16}$$

$$r(t_0) = 4$$

LISTA 02

6)



$$h(t_0) = 1,2 \text{ m}$$

$$V'(t_0) = 0,081 \text{ m}^3/\text{min}$$

$$h'(t_0) = ?$$

$$V(t) = \frac{1}{3} \cdot \pi \cdot r^2(t) \cdot h(t)$$

$$V(t) = \frac{\pi}{3} \cdot \left(\frac{3}{2} h(t)\right)^2 \cdot h(t) = \frac{\pi}{3} \cdot \frac{9}{4} h^2(t) \cdot h(t)$$

$$V(t) = \frac{3\pi}{4} h^3(t)$$

$$V'(t) = \frac{3 \cdot \pi}{4} \cdot 3 h^2(t) \cdot h'(t)$$

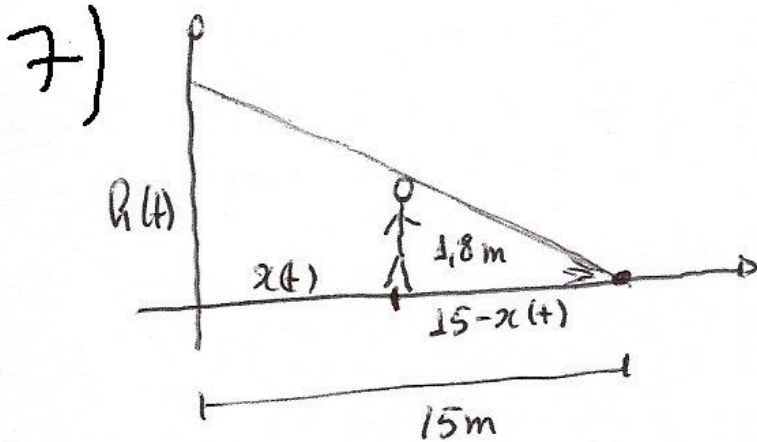
$$V'(t) = \frac{9\pi}{4} \cdot h^2(t) \cdot h'(t)$$

$$V'(t_0) = \frac{9\pi}{4} \cdot h^2(t_0) \cdot h'(t_0)$$

$$0,081 = \frac{9\pi}{4} \cdot (1,2)^2 \cdot h'(t_0)$$

$$h'(t_0) = \frac{4 \times 0,081}{9\pi \times 1,44} = \frac{1}{40\pi} \text{ m/min}$$

LISTA 02



$$x'(t) = -1,2\text{ m/s}$$

$$x(t_0) = 12\text{ m} \text{ e } x(t_0) = 9\text{ m}$$

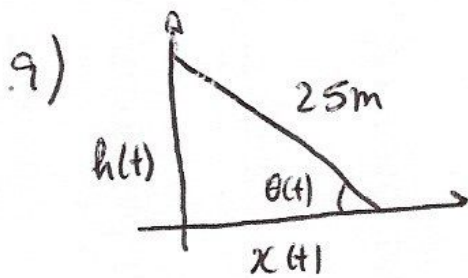
$$\frac{h(t)}{15} = \frac{1,8}{15 - x(t)}$$

$$h(t) = \frac{15 \times 1,8}{15 - x(t)} \Rightarrow h'(t) = \frac{-27}{(15 - x(t))^2} \quad (-x'(t)) = \frac{-27 \cdot (1,2)}{(15 - x(t))^2}$$

$$x(t_0) = 12 \Rightarrow h'(t_0) = \frac{-27 \cdot (1,2)}{(15 - 12)^2} = -3,6\text{ m/s}$$

$$x(t_0) = 9 \Rightarrow h'(t_0) = \frac{-27 \cdot (1,2)}{(15 - 9)^2} = -0,9\text{ m/s}$$

LISTA 02



$$x(t_0) = 7\text{m}$$
$$x'(t_0) = 2\text{m/s}$$

a) $h'(t_0) = ?$

$$h^2(t) = 25^2 - x^2(t)$$

$$h^2(t_0) = 25^2 - 7^2 = 576 \Rightarrow h(t_0) = 24\text{m}$$

$$2h(t) \cdot h'(t) = 0 - 2x(t) \cdot x'(t)$$

$$h(t_0) \cdot h'(t_0) = -x(t_0) \cdot x'(t_0)$$

$$24 \cdot h'(t_0) = -7 \cdot 2$$

$$h'(t_0) = -\frac{7}{12} \text{ m/s}$$

b) $A'(t_0) = ?$

$$A(t) = \frac{x(t) \cdot h(t)}{2} \Rightarrow A'(t) = \frac{1}{2} (x'(t) \cdot h(t) + x(t) \cdot h'(t))$$

$$\Rightarrow A'(t_0) = \frac{1}{2} (x'(t_0) \cdot h(t_0) + x(t_0) \cdot h'(t_0))$$

$$A'(t_0) = \frac{1}{2} (2 \cdot 24 + 7 \cdot (-\frac{7}{12}))$$

$$A'(t_0) = \frac{527}{24} \text{ m}^2/\text{s}$$

$$c) \theta'(t_0) = ?$$

$$\sin(\theta(t)) = \frac{h(t)}{25}$$

$$\cos(\theta(t)) \cdot \theta'(t) = \frac{h'(t)}{25}$$

$$\theta'(t_0) = \frac{h'(t_0)}{25 \cdot \cos(\theta(t_0))}$$

$$\cos(\theta(t_0)) = \frac{x(t_0)}{25} = \frac{7}{25}$$

$$\theta'(t_0) = \frac{-7/12}{25 \cdot 7/25} = -\frac{1}{12} \text{ rad/s}$$